Available online at www.sciencedirect.com

ScienceDirect

Green Energy & Environment 1 (2016) 3

www.keaipublishing.com/gee

Commentary

Li−O_2 batteries

Yingying Lu [a,b,*]

[a] College of Chemical and Biological Engineering, Zhejiang University, Hangzhou 310027, China
[b] State Key Laboratory of Chemical Engineering, Hangzhou 310027, China

Received 11 February 2016; revised 19 April 2016; accepted 29 April 2016
Available online 6 May 2016

Science **2015,** 350, 530-533

Rechargeable lithium-air (Li−O_2) batteries have received considerable attentions due to their much higher theoretical energy densities than today's lithium-ion batteries. However, they still suffer from at least four limitations: (1) much lower capacity than theoretical capacity, stemming from the small pore sizes and volumes of the current porous electrode; (2) side reactions, including electrode materials, electrolyte, intermediate and final discharge products; (3) large hysteresis and low energy efficiencies; (4) moisture and CO_2 sensitivity. Grey and colleagues now show that a novel Li−O_2 battery with lithium metal as the anode, lithium bis(trifluoromethyl) sulfonylimide/dimethocxyethane (LiTFSI/DME) as the electrolyte, LiI as electrolyte additive, and reduced graphene oxide as the counter electrode can improve the energy efficiency, reduce the overpotential, tolerate large quantities of water and remarkably increase the cell capacity. This battery undergoes redox reactions via LiOH formation, not conventional Li_2O_2, and is insensitive to relatively high levels of water. The electrolyte additive, LiI serves as a redox mediator and protects the cell from water contamination. Unlike common Li−O_2 batteries, which use mesoporous super P as the electrode, the reduced graphene oxide (GO) electrode leads to high efficiency and capacity because it is light, conductive, and has a large pore volume. This Li−O_2 battery is demonstrated by electrochemical cycling and shows enhanced capacity, no capacity fade and little increase in voltage polarization after thousands of cycles.

* Corresponding author.
E-mail address: yingyinglu@zju.edu.cn.

http://dx.doi.org/10.1016/j.gee.2016.04.007